

CLAIMS

1. A method of reading a data item from a storage system comprising:
maintaining a plurality of copies of said data item on a plurality of data storage
devices;
5 receiving a read request for said data item; and
initiating read operation requests to two or more of said plurality of said data
storage devices in response to receiving said read request.
2. The method of claim 1 further comprising:
10 identifying which of said read operation requests is projected to produce a fastest
response time.
3. The method of claim 2 further comprising:
canceling one or more of said read operation requests which are not projected to
15 produce the fastest response time.
4. The method of claim 2 further comprising:
failing to use one or more copies of said data item retrieved as a result of said read
operation requests which are not projected to produce the fastest response time.
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5. The method of claim 2 in which said act of identifying which of said read
operation requests is projected to produce a fastest response time comprises:

determining which of said read operation requests results in a first movement from one level of request queues to another.

6. The method of claim 2 in which said act of identifying which of said read
5 operation requests is projected to produce a fastest response time comprises:
determining which of said read operation requests results in a first retrieval of a
copy of said data item from one of said plurality of data storage devices.

7. The method of claim 1 in which mirroring is employed to maintain said plurality
10 of copies of said data item on said plurality of data storage devices.

8. The method of claim 1 in which said plurality of data storage devices comprise
disk drives.

15 9. A method of writing a data item to a storage system having a plurality of data
storage devices, comprising:
receiving a write request for said data item, said write request requesting a
number of copies of said data item to be written to said plurality of data storage devices;
initiating write operation requests to a selected number of said plurality of data
20 storage devices in response to receiving said write request, the selected number of said
plurality of data storage devices exceeding said number of copies of said data item to be
written.

10. The method of claim 9 further comprising:

identifying which of said written operation requests is projected to produce a fastest response time.

5 11. The method of claim 10 further comprising:

canceling selected ones of said write operation requests which are not projected to produce the fastest response time.

12. The method of claim 10 further comprising:

10 allowing selected ones of said write operation requests which are not projected to produce the fastest response time to complete; and

deleting copies of said data item written to disk by said selected ones of said write operation requests.

15 13. The method of claim 10 in which the act of identifying which of said write operation requests are projected to produce the fastest response time comprises an identification of which of said write operation requests is first to complete writing said data item to one of said plurality of data storage devices.

20 14. The method of claim 10 in which the act of identifying which of said write operation requests are projected to produce the fastest response time comprises a determination which of said write operation requests results in a first movement from one level of request queues to another.

15. The method of claim 9 in which copies of said data item are written to two or more of said plurality of data storage devices.

5 16. A method of updating a data item that is stored in a storage system having a plurality of data storage devices comprising:

receiving an update request for said data item, said update request requesting a number of copies of said data item to be maintained on said plurality of data storage devices; and

10 initiating update operation requests to a selected number of said plurality of data storage devices in response to receiving said update request, said selected number of said data storage devices exceeding said number of copies of said data item that are to be maintained on said plurality of data storage devices.

15 17. The method of claim 16 further comprising:

identifying which of said update operation requests are projected to produce a fastest response time.

18. The method of claim 17 further comprising:

20 canceling selected ones of said update operation requests which are not projected to produce the fastest response time.

19. The method of claim 17 further comprising:

allowing selected ones of said update operation requests which are not projected to produce the fastest response time to complete; and

deleting copies of said data item written to disk by said selected ones of said update operation requests.

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20. The method of claim 17 in which the act of identifying which of said update operation requests are projected to produce the fastest response time comprises an identification of which of said update operation requests is first to update said data item to one of said plurality of data storage devices.

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21. The method of claim 17 in which the act of identifying which of said update operation requests are projected to produce the fastest response time comprises a determination which of said update operation requests results in a first movement from one level of request queues to another.

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22. The method of claim 16 in which one or more of said update operation requests is directed to updating an existing copy of said data item on one of said plurality of data storage devices. —

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23. The method of claim 16 in which said update operation requests write copies of said data item to corresponding new sections of said data storage devices and further comprising:

reconfiguring pointers to point to said corresponding new sections of said data storage devices.

24. The method of claim 23 further comprising:

5 deleting copies of said data item that are no longer pointed to by said pointers.

25. A computer program product that includes a medium readable by a processor, the medium having stored thereon a sequence of instructions which, when executed by said processor, causes said processor to execute a process to read a data item from a storage system by performing the acts:

maintaining a plurality of copies of said data item on a plurality of data storage devices;

receiving a read request for said data item; and

15 initiating read operation requests to two or more of said plurality of said data storage devices in response to receiving said read request.

26. A computer program product that includes a medium readable by a processor, the medium having stored thereon a sequence of instructions which, when executed by said processor, causes said processor to execute a process to update a data item that is stored in a storage system having a plurality of data storage devices comprising the acts of:

20 receiving a write request for said data item, said write request requesting a number of copies of said data item to be written to said plurality of data storage devices;

initiating write operation requests to a selected number of said plurality of data storage devices in response to receiving said write request, the selected number of said plurality of data storage devices exceeding said number of copies of said data item to be written.

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27. A computer program product that includes a medium readable by a processor, the medium having stored thereon a sequence of instructions which, when executed by said processor, causes said processor to execute a process to write a data item to a storage system having a plurality of data storage devices comprising the acts of:

10 receiving an update request for said data item, said update request requesting a number of copies of said data item to be maintained on said plurality of data storage devices; and

initiating update operation requests to a selected number of said plurality of data storage devices in response to receiving said update request, said selected number of said
15 data storage devices exceeding said number of copies of said data item that are to be maintained on said plurality of data storage devices.